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Original research

The management of perforated gastric ulcers☆

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ABSTRACT

Introduction: Perforated gastric ulcers are potentially complicated surgical emergencies and appropriate early management is essential in order to avoid subsequent problems including unnecessary gastrectomy. The aim of this study was to examine the management and outcome of patients with gastric ulcer perforation undergoing emergency laparotomy for peritonitis.

Methods: Patients undergoing laparotomy at the Royal Infirmary of Edinburgh for perforated gastric ulcers were identified from the prospectively maintained Lothian Surgical Audit (LSA) database over the five-year period 2007–2011. Additional data were obtained by review of electronic records and review of case notes.

Results: Forty-four patients (25 male, 19 female) were identified. Procedures performed were: 41 omental patch repairs (91%), 2 simple closures (4.5%) and 2 distal gastrectomies (4.5%; both for large perforations). Four perforated gastric tumours were identified (8.8%), 2 of which were suspected intra-operatively and confirmed histologically, 1 had unexpected positive histology and 1 had negative intra-operative histology, but follow-up endoscopy confirmed the presence of carcinoma (1 positive biopsy in 21 follow-up endoscopies); all 4 were managed without initial resection. Median length of stay was 10 days (range 4–68). Overall 7 patients died in hospital (15.9%) and there were 21 morbidities (54.5%). Registrars performed the majority of the procedures (16 alone, 21 supervised) with no significant difference in post-operative morbidity ($P = 0.098$) or mortality ($P = 0.855$), compared to consultants.

Conclusion: Almost all perforated gastric ulcers can be effectively managed by laparotomy and omental patch repair. Initial biopsy and follow-up endoscopy with repeat biopsy is essential to avoid missing an underlying malignancy.

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1. Introduction

Perforated ulcers of the upper gastrointestinal tract are potentially complicated surgical emergencies. If laparotomy is undertaken and a straightforward duodenal ulcer encountered, closure with an omental patch is well-established as the optimal procedure.[1,2] However, when a gastric ulcer is identified, a decision is required as to whether a) a simple patch is adequate (with biopsy); b) whether local excision of the ulcer is possible or c) whether resection and reconstruction is indicated.

The most common aetiology underlying upper gastrointestinal perforation is peptic ulceration[3] and gastric perforation represents 10–15% of all peptic ulcers.[4] In contrast to duodenal ulcers, where the incidence of cancer is almost zero, 6–14% of perforated gastric ulcers (PGU) will have a malignant aetiology.[3–6] This small but important figure has the potential to influence the decision to patch or resect.

The traditional approach has often been to perform a wedge excision or even a formal resection at the index operation, when the ulcer is in an atypical location[6,7] or 'looks' malignant, a prospect that may sometimes appear daunting to the non-specialist. Recently, there has been a return to a more conservative initial approach, with reports of either delayed resection[5] or two-stage surgery which includes an initial non-radical resection, followed by lymphadenectomy at a later date.[8] Furthermore the ability to cure gastric lymphoma without resection[9–11] has led to many upper GI surgeons advocating biopsy and repair at the index operation and then deciding at a later date how best to proceed if adenocarcinoma has been diagnosed.[12,13]

The aim of this study was to examine the management and outcome of patients with gastric perforations undergoing emergency laparotomy for peritonitis in a consecutive and contemporary series, with specific respect to the requirement for resection and the prevalence of malignancy as the underlying aetiology.

☆ Results from this study have been presented at the Digestive Diseases Federation Conference, Liverpool June 2012.

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2. Methods

2.1. Subjects

Patients undergoing laparotomy for PGU were identified from the prospectively maintained Lothian Surgical Audit (LSA) database over the five-year period between 2007 and 2011.

2.2. Data sources

The LSA database contains the operative and discharge record for every patient episode along with discharge and out-patient clinic letters and these were correlated with the case notes where necessary. The UNISOFT™ endoscopy reporting system was used to search for subsequent endoscopic findings. The South East Scotland oesophagogastric Cancer Network (SCAN) database and the histopathology laboratory Database (APEX™) were also used to provide additional pathological data.

2.3. Statistics

Pearson's χ^2 and Fisher's exact test were used to correlate categorical variables and calculated using SPSS statistics, version 19 (IBM).

3. Results

Forty five patients were identified from LSA, and either notes or electronic records available for 44 of them (97.8%). Data on these 44 patients was analysed. None of the patients were known to have gastric malignancy prior to their emergency presentation. Over half of the patients had a pre-operative Computed Tomography (CT) scan, in which 2 scans were reported as showing possible malignancy. Histology confirmed malignancy in one of these patients (Table 1).

The majority of operations were performed by Surgical Registrars (16 alone, 21 supervised) with no significant difference in morbidity 18/37 vs. 6/7 ($P = 0.098$) or mortality 6/37 vs. 1/7 ($P = 0.855$) when compared to those procedures performed by Consultant Surgeons, who performed 7 procedures. All but two patients were managed with simple procedures, except in the case of large perforations where distal gastrectomy was required (Table 2).

The median length of stay was 10 days (range 4–68) and other post-operative data are summarised in Table 3. The overall inpatient mortality was 7/44 15.9% and there were 24 morbidities (54.8%; including 9 respiratory complications, 4 wound infections and 2 myocardial infarctions). The site of perforation did not significantly affect morbidity ($P = 0.326$) or mortality ($P = 0.865$).

Four perforated gastric adenocarcinomas were identified in this series (8.8%), 2 of which were suspected intra-operatively and confirmed histologically, 1 had unexpectedly positive histology and 1 had negative intra-operative histology, but the presence of carcinoma was confirmed on follow-up endoscopy; all 4 were managed without resection at initial laparotomy. One of these patients underwent subsequent resection for cancer after full staging, pre-operative chemotherapy (3 cycles of epirubicin, cisplatin and capecitabine) and optimisation, but declined post-operative chemotherapy and subsequently developed tumour recurrence and died. Of the remaining patients, 1 died in hospital on post-operative day 14, 1 declined further treatment and died 7 months after his acute presentation and 1 received a course of palliative chemotherapy.

Of the 44 patients in this series, 21 underwent follow-up endoscopy, 7 died in hospital post-operatively and 8 were deemed too frail to justify further follow-up. One patient with ongoing alcohol abuse and moderately severe COPD did not attend an endoscopy appointment but has not subsequently developed signs of gastric malignancy and in the remaining 7 patients, the benign histology from the initial operation was deemed sufficient.

Table 1
Pre-operative patient demographics.

Characteristic	Number	%
Age (mean)	60.0 years (18–91)	
Sex		
Female	19/44	43.2
Male	25/44	56.8
Risk factor		
Alcohol	7/44	15.9
NSAIDs	5/44	11.4
Previous PUD	2/44	4.5
Pre-op CT	24/44	54.5
CT suggestive of malignancy	2/44	4.5
CT correctly diagnosed malignancy	1/2	50

(NSAID = non-steroidal anti-inflammatory drug; CT = Computed tomography; PUD = Peptic ulcer disease).

Table 2
Intra-operative findings and operative details.

Characteristic	Frequency	%
Grade of surgeon		
Consultant performed	7/44	15.9
Registrar supervised	21/44	47.7
Registrar independent	16/44	36.4
Access		
Open	41	93.2
Lap-converted	3	6.8
Laparoscopic	0	0
Ulcer location		
Upper third	5/44	11.4
Middle third	8/44	18.2
Lower third	26/44	59.1
Other/Not stated[a]	5/44	11.4
Cancer		
Operative suspicion	5/44	11.4
Confirmed histologically	2/5	40
Intra-operative biopsy performed	33/44	75
Cancer detection at operation	3/44	6.8
Procedure performed		
Simple closure	2/44	4.5
Patch	40/44	90.9
Distal gastrectomy	2/44	4.5

[a] Other/Not stated locations included 3 perforated stomal ulcers, 1 which was only recorded as posterior and another which was not stated.

4. Discussion

The identification of malignant gastric perforations is not always easy, even at laparotomy and a review of the literature 10 years ago demonstrated that a pre-operative diagnosis of malignancy was only available in 0–42.1% of patients.[8] In the present series, none of

Table 3
Post-operative outcomes.

Characteristic	Frequency	%
Post-operative destination		
ITU	20/44	45.5
HDU	7/44	15.9
WARD	17/44	38.6
LOS	10 (4–68)	
Follow-up endoscopy		
Performed	21/36	58.3
Endoscopic biopsies taken	3/21	14.3
Malignancy identified by endoscopy	1/21	4.8
Further treatment for malignancy		
Palliative chemotherapy	1	
NAC and resection	1	
Inpatient morbidity	24/44	54.5
Inpatient mortality	7/44	15.9

(ITU = Intensive Therapy Unit; HDU = High Dependency Unit; LOS = Length of Stay; NAC = Neoadjuvant chemotherapy).

the patients presented with a known diagnosis of gastric cancer and only one of the two patients in whom a malignancy was suspected on the pre-operative CT was confirmed histologically. The operative suspicion of cancer was correct in 2 of 5 patients and malignancy was diagnosed unexpectedly in another patient. Furthermore, an additional case of malignancy was only identified at follow-up endoscopy. In this series, a quarter of patients did not have histological specimens taken at the index operation. Given the difficulty of identifying tumours radiologically and intra-operatively, it must be emphasised that a specimen for histology should be obtained wherever possible and that follow-up endoscopy must be arranged for all appropriate patients.

Radical approaches have been suggested by a number of author groups including: initial oncological resection[6]; initial simple resection with later lymphadenectomy[8] or a selective policy based on the patient's condition.[14] Interestingly, a scoring system incorporating pre-operative and intra-operative factors to predict the presence of malignant disease has also been proposed.[3]

On the other hand, a policy of omental patch repair whenever possible seems to render such estimations unnecessary. Although some debate exists in the literature, such a policy has been supported by our series and by other authors.[5,12,13] Performing a simple patch repair in the emergency setting is within the competence of the non-specialist emergency general surgeon, as demonstrated by the fact that the majority of the procedures in our series were performed by Surgical Registrars, with or without supervision, with good results. Survival following resection for a perforated gastric cancer is universally dismal[7,15] and cure can be obtained for gastric lymphoma without the need for resection.[9–11] There is therefore little justification to resect a PGU, even if malignancy is suspected, unless there is no alternative to obtaining adequate closure.

The relatively advanced age and the fact that the majority of patients in our study required critical care post-operatively, similar to the results of other studies,[16] indicate that gastric perforations tend to occur in an older, more frail population than duodenal perforations. This fact, together with the high morbidity and mortality rate accompanying PGU (Table 3), is an additional argument for a more conservative approach during the index procedure. Furthermore, studies have suggested that perforated gastric cancers tend to be of a more advanced stage[8,15,17] and emergency resection in such a patient with incomplete or sub-optimal staging may therefore be inappropriate given the very low likelihood of cure.

Although this study relied on retrospective data analysis from the patients' notes, the accuracy of the prospectively collected operative database using LSA is highly accurate and is regularly checked against other local and national information sources.[18] Better long-term follow-up data would be useful, as patients presenting to other units would not be picked up by the LSA system. However cross-checking with the oesophagogastric cancer database should have picked up any patients who subsequently developed cancer who were missed from initial analysis.

In conclusion, this study has shown that a policy of omental patch repair for all but the largest gastric ulcer perforations results in acceptable outcomes in the emergency setting. In view of pre-operative and intra-operative diagnostic uncertainty, along with the lack of full staging of potential malignancy (including lymphoma) and the controversy as to the place of resection for cure; patch repair and biopsy is recommended where possible. Follow-up endoscopy should be routinely carried out in the majority of patients after discharge home to ensure healing and exclude malignancy.

Patient consent

This work does not contain personal medical information about any identifiable individual.

Ethical approval

Ethical approval was not sought because this was a retrospective study, and did not compare more than one treatment.

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None.

Author contribution

Matthew Leeman was involved in study design, data collection, data analysis and writing of the work described in the article.

Christos Skouras was involved in study design, data collection, data analysis and writing of the work described in the article.

Simon Paterson-Brown was involved in study design, data analysis and writing of the work described in the article.

Competing interests

None declared.

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